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## THE GUATEMALA EARTHQUAKE OF DECEMBER, 1917, AND JANUARY, 1918

*In December, 1917, and January, 1918, the city of Guatemala was practically destroyed by earthquakes. The following is the account of a prominent resident of that city, as given to Professor Marshall H. Saville of the Museum of the American Indian, Heye Foundation, New York. At the end Professor Saville continues the narrative and has added a few words of comment. For further information on Guatemalan earthquakes and their relation to the seismic activity of Central America see the works cited below.<sup>1</sup>*

Two years ago, during the months of December and January, the city of Guatemala had been shaken by a series of severe earthquakes, lasting seven or eight weeks, and people by the thousands spent the nights in their courtyards or in the public parks and squares. These shocks, however, passed off without doing any considerable damage to the city, and this confirmed the Guatemalans in an ancient belief that their city, being almost entirely surrounded by deep ravines, was effectually protected against destructive earthquakes. A hundred and forty-five years ago the location of the city was carefully selected under the influence of this theory, and during all these years it had never been seriously damaged, while many other large cities in all parts of Central America were destroyed one after another. This unfortunate theory was also the reason why no thought whatever was given to earthquakes in our system of building. Only recently have a few concrete buildings and a few frame houses been erected by far-

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<sup>1</sup> S. G. Morley: The Guatemala Earthquake [of 1917-18], *Amer. Museum Journ.*, Vol. 18, 1918, pp. 200-210.

———: The Guatemala Earthquake [of 1917-18], *Pan-American Mag.*, Vol. 26, 1917-18, pp. 305-317.

(Crichton Mitchell): Seismic Disturbances Connected With the Guatemala Earthquake, *Nature*, Feb. 28, 1918, pp. 514-515.

Tempest Anderson: The Volcanoes of Guatemala, *Geogr. Journ.*, Vol. 31, 1908, pp. 473-489, with map, 1:500,000.

Gustav Eisen: The Earthquake and Volcanic Eruption in Guatemala in 1902, *Bull. Amer. Geogr. Soc.*, Vol. 35, 1903, pp. 325-352.

F. de Montessus de Ballore: Temblores y erupciones volcánicas en Centro-América, 246 pp., San Salvador, 1884 (French version, Dijon, 1888).

*Idem*: Les tremblements de terre: Géographie séismologique, Paris, 1906, Chapter 21, Section 2: Le Centre-Amérique.

Karl Sapper: Die mittelamerikanischen Vulkane, 173 pp., *Ergänzungsheft zu Petermanns Mitt.* No. 178, Gotha, 1913.

*Idem*: Die geographische Bedeutung der mittelamerikanischen Vulkane, *Zeitschr. Gesell. für Erdkunde zu Berlin*, 1902, pp. 512-536.

*Idem*: In den Vulcangebieten Mittelamerikas und Westindiens, 334 pp., Nägels, Stuttgart, 1905.

*Idem*: Ergebnisse seiner Reisen in Mittelamerika, *Verhandl. Gesell. für Erdkunde zu Berlin*, Vol. 27, 1900, pp. 417-426, with map of tectonic lines of Central America, 1:5,000,000.

*Idem*: Grundzüge des Gebirgsbaus von Mittelamerika, *Rept. 8th Internat. Geogr. Congr. Held in the U. S.* 1904, Washington, 1905, pp. 230-238, with map of tectonic lines of Central America, 1:5,000,000.



FIG. 1.



FIG. 2.

FIG. 1—Ruins of the church on the Cerro del Carmen, the oldest church in the city.

FIG. 2—Ruins of the church of Santa Teresa.

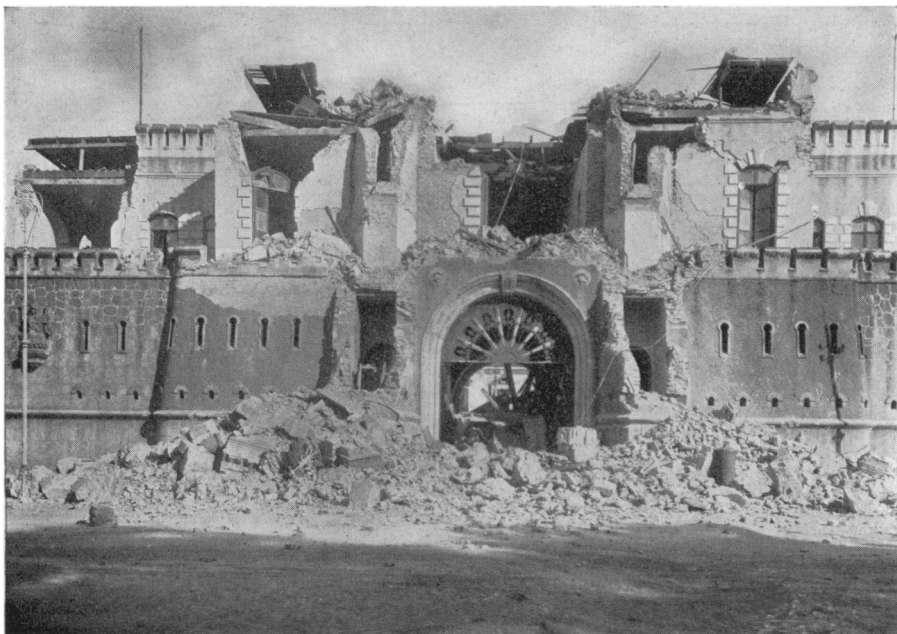


FIG. 3.



FIG. 4.

FIG. 3—Ruins of the Military Academy.

FIG. 4—Interior of a ruined church.

seeing persons. The rest of the city is built on shallow foundations, with weak walls of red brick or sun-dried mud, and heavy tile roofs, whose unsightliness was hidden by exceedingly heavy over-roof walls and cornices. So when a real earthquake caught us we were in no condition to resist it, and our childish theory was thrown to the ground together with our houses.

The present series of earthquakes began on November 17, 1917, with great severity, and kept on for three weeks, making small cracks in many walls and knocking down some top-heavy cornices. Then there was a lull till Christmas Eve. On that evening there was a severe shock, followed by several minor ones, all, however, of the kind to which we had been accustomed for generations. The great and unprecedented disaster was reserved for Christmas Day.

### THE CHRISTMAS SHOCK

At about 10.35 on Christmas night the town was aroused by a shock such as had never struck it before. The earth rocked like the sea for about a minute. The falling of furniture, the crackling of ceilings and roofs, and the swaying of walls were stupefying. Everyone immediately sought shelter in the streets though the cold was piercing. The electric lights were soon extinguished, but in the clear light of the full moon one could see the walls cracking and toppling, and the tiles thrown about in confusion on the roofs. The crowds stood about in their night clothes looking on in terror and helpless despair at the ruin of their homes and recounting their experiences. The earth trembled every few minutes, though less violently for a time; but about half an hour after the first great shock there followed another of equal duration and even greater violence. Houses swayed to and fro before our eyes, till the walls that had been cracked or shaken out of plumb came down with a crash, followed by ceilings and roofs. For a few brief seconds the rumbling of falling houses was mingled with the underground roarings of the earth and the suppressed moans and loud prayers of the women for mercy. Then all was still once more. The angel of destruction passed on, for his work was done, completely and thoroughly done, and in his wake lay the scattered ruins of the proud "City of Santiago of the Cavaliers of Guatemala." But the earth had not yet righted itself, and the trembling kept up with slight interruptions till daybreak. The crowds either stood all night stupefied before their houses or moved down the middle of the streets towards the open squares to await in terror what might still be in store for them. When the dawn came the whole awful scene of destruction was laid bare.

The high massive façade of Saint Francis Church was rent in every direction, and great blocks of masonry lay scattered about. The roof of Saint Claire's Church had fallen in from altar to portal and burst open the heavy door. The tall fluted cupola of the Church of the Recollection, a marvel of grace and beauty, had fallen into the nave. The great yellow

glazed cupola of the Cathedral fell at the second shock with a terrific noise. Towers, belfries, and façades of churches in all parts of the city were either thrown down or split wide open, and left standing at all angles on the thick lower walls. The post office was smashed to pieces, and its wreckage filled the street. One entire wall of the railroad station had fallen out, and the clock tower was knocked down. The British Legation and the Custom-house were heaps of ruins. As for the dwelling houses, on all sides their outer walls were thrown down into the street, their roofs fallen in on gaping bedrooms and sitting rooms, their rafters and tiles piled on top of beds and tables, while smashed clocks, mirrors, and pictures littered the ground or hung awry upon the walls.

On December 26, when the violence of the tremblings had partly subsided, people began to creep back into their homes to rescue some of their belongings, principally bedding and clothing. It was then found that many houses which seemed uninjured from the outside were dangerously cracked within, and most of those left standing were so badly damaged that they would have to be torn down.

But we were to be spared that trouble; for slight shocks kept up during the whole of the 26th, and at two o'clock in the morning of the 27th a third powerful shock aroused the slumbering people, and many more houses were heard to fall. Also at intervals many walls that were out of plumb fell over of their own weight.

#### THE SHOCK OF DECEMBER 28

On the 28th at half-past two in the afternoon a long and terrible shock overtook us. This was the first mighty and destructive shock that happened during daylight, and many women fainted with terror. It was on this occasion that Dr. Manuel Del Valle, riding out on a Red Cross errand, was caught by a falling house and crushed to death together with his horse.

Then followed a period of comparative respite, and people began to collect their senses. They soon got out their beds into the streets, set up their tables and bureaus around them, and covered the whole with carpets or any kind of cloth to shelter themselves during the night. They began putting up shacks of every nondescript shape in the parks and open squares. Probably there were not a dozen families that still dared to live in their shattered houses. In every public square and on the plains around the town sprang up villages of gypsy-like huts. They were crowded together; built of carts and carriages, pieces of furniture, and broken doors and windows; and covered with galvanized iron, helped out with blankets, flags, tablecloths, carpets, and sacking. While food at first was not exactly abundant, there was no famine or even actual want. The government saw to it that the people were well supplied with meat at low prices. Meat, maize cakes, and coffee were our principal diet in these days; and as soon

as the bakers could get to work again bread made its appearance, though it was bad and dear. New Year's Day came and went, and nobody thought of wishing his neighbor a Happy New Year except with a sarcastic laugh.

### THE SHOCK OF JANUARY 3

During all these days the earthquakes never ceased. At intervals of an hour or so they reminded us that all was not yet well; but, as our lives now



FIG. 5—Ruined freight cars in front of customs house sheds. Of the original sheds only the walls are standing; the roof and sides were put up after the earthquake.

seemed safe and our property was already destroyed, we had become quite indifferent and hardly did more than look around us at each new tremor. But we were soon awakened from our indifference. On the night of January 3 came the terror of terrors, the most pitiless and awful blow that had yet struck this poor shattered city. At a quarter to eleven there was a loud subterranean growl, and the earth seemed to have been struck a great blow that sent it up, and then let it fall down with a thud, and then sent it swinging and shivering in swift jerks which kept on and on and would not stop, while the underground roarings continued till one's mind was so stunned and confused that it seemed as if the world were crumbling to pieces. This must have lasted a minute and a half.<sup>2</sup> No one now looked up to say unconcernedly "There's another" or to make flippant remarks. The helpless sufferers sat up on the ground where they had been sleeping, firmly propping themselves with their arms for support, and no words but "Oh, Oh, Oh" were anywhere heard. When the shock had passed away everyone felt like crying aloud at the cruelty and brutality of it all, but while it lasted one's only feeling was of groveling terror.

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<sup>2</sup> According to a credible informant the shock lasted eleven minutes!

## THE DESTRUCTION WROUGHT

In the morning it was seen that the two massive towers of the Cathedral had been thrown down, one to the north on the Archbishop's residence, and the other to the south on top of the bishopric school. This seems to show that the oscillation was north and south. The beautiful Church of the Recollection was leveled to the ground, not a stone left upon stone. Even thick brick walls of the penitentiary were laid low; the fortress of



FIG. 6—The plaza in front of the Cathedral showing shacks, some of them housing government departments, erected after the earthquake.

San José, overlooking and dominating the city, could hardly be made out, for it was flat with the ground. The railroad station had been tumbled into one huge heap of wreckage. The entrance into the city for those who came by train will never fade from their minds. After leaving the train and the ruins of the station, one emerged upon a street buried with débris of fallen houses lying deep in dust, and up and down the street as far as eye could reach not a house was left standing. The center of the town suffered least. There, some ancient, low, and very solid brick houses were apparently uninjured; but probably not five out of a hundred houses in the city can be repaired and made habitable again.

## RELIEF MEASURES

No official figures of the loss of life have been issued; but it is believed that less than fifty persons perished.<sup>3</sup> The first severe shock gave sufficient time to escape from the houses, and after that everyone camped out in the open; but some who ventured back into their houses to get out bedding and

<sup>3</sup> A later and what is believed to be more accurate estimate places the total number of dead as the result of the various shocks at six hundred.—M. H. S.



other effects were caught and killed in the second shock of Christmas night.

The distress has been much relieved by emigration to the country. Nearly all the planters and all others who have country places have sent away their families, and hundreds of these kindhearted people have sent out invitations indiscriminately to their city acquaintances to come out and join them in the country.

The six city banks and the United Fruit Company have built wooden offices in the main square. All bank credits have been suspended, and the banks have limited payments to each depositor to \$25 a week. These measures have greatly increased the distress, for now no one has the wherewithal to pay his servants or employees.<sup>4</sup> The bank safes are supposed to be empty, for the banks have loaned out not only the paper bills they were authorized to issue, but almost all of their deposits. They have now asked the government for authority to issue the equivalent of two million dollars American gold in Guatemalan paper, so as to pay depositors and resume credits.

#### THE PROBLEM OF REBUILDING THE CITY

And now the problem that confronts us is the clearing away of the old town and the building of the new. This is such a large and many-sided question and has been thrust upon us so suddenly that no one is ready with a complete answer. In the first place where shall we get the means to rebuild? When San Francisco was burned down, she turned to the fire insurance companies for relief; but there is no insurance against earthquakes. At present our only hope is in the banks; but it is clear that they would have to loan almost the full value of the house in order to rebuild it, and would any bank be willing to do this?

Then again our whole system of building must be altered. It would be the height of folly to rebuild the city of brick and adobe in this land of earthquakes. On this all are agreed. With the introduction of frame buildings, which have shown themselves to be earthquake-proof, the streets should be widened, the houses built farther apart, a reformed and modern water system put in, and efficient fire protection established. Until we are prepared to do all this the reconstruction of the city should not be begun. Halfway measures would be unavailing and dangerous.

Fortunately for Guatemala the source of her wealth is not in the city. The city has never produced anything worth mentioning and has never been more than a trading place for the middleman and speculator and a lounging place for the idle and ignorant rich. The country's wealth lies in her ever-green pastures with their tens of thousands of head of cattle; her magnificent plantations of coffee and sugar; her fertile fields of grain; her orchards of tropical fruit; and her great forests of cedar, mahogany,

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<sup>4</sup> This condition was modified later, and banks allowed depositors to withdraw any sums required.

and other precious timber. All this beautiful and bountiful inheritance is left to her still—and from it must come in the end the means to reconstruct a capital worthy of this wonderful land.

Here we sit beside our little shacks in the starlight with high hopes and great ambition, dreaming of our departed splendor and how to restore it. We intend to restore it, though it may take Guatemala City a generation of patient industry and economy to regain her past glory. Even then all about the newly risen town there will always stand the massive ruins of the great churches, like giants among pygmies, to remind our sons of the terrible Christmas night of 1917.

*From here on the narrative is continued by Professor Saville.*

#### THE SHOCK OF JANUARY 24

The sixth great shock came with the full moon on the evening of January 24. The writer was traveling from Quirigua to Guatemala by train, which had been delayed near Agua Caliente by a slight slide in one of the numerous cuts. Hence the train which should have arrived in the city at 6.30 P.M. was more than one hour behind time. At 7.25 precisely, when we were about five miles out and were just emerging from a deep cut, a stone about the size of a baseball came rolling down the side and struck the sill of the window by which I was seated. The next instant a deep roaring was heard, accompanied by a terrific jolt against the south side of the train. This was immediately followed by a lifting shock on the other side. The train was going slowly, perhaps four miles an hour, and the engineer brought it to a stop within twenty feet. My first impression, due to the stone which had fallen, was that the side of the cut had caved in and that enormous stones had been thrown under and against the train. When we found, however, that the train had not been struck, we at once understood what had happened. Soon we began to feel tremors and quiverings of the earth, and from this time until 4.30 A.M. the earth was never quiet. From time to time we experienced sharp shocks, and were afterward told that forty-three distinct earthquakes had taken place. The train proceeded about a mile farther, stopping three times to have small slides in the cuts cleaned out before going through. We came finally to the last and deepest cut about four miles outside the city. This we found to be choked up for some distance; it was not cleared for a week, as the walls had been so shaken that as fast as it was cleared it again filled up. We spent the night on the train, and walked into town the next morning. In many places the road was partially blocked by débris which had fallen along the sides, especially where the road descended into the *barranca* just before entering the city. In the four miles of road I counted two hundred cracks running approximately from south to north, although there were a

few running at right angles. This direction of the cracks may be significant, as they proceed from the general direction of the quiescent volcano Pacaya. That the movement comes from this region, and not from north to south, was clearly demonstrated by one crack which I observed in the middle of the road with four branches radiating towards the north for a short distance.

Many persons affirm that this shock or series of shocks was the worst shaking which the city experienced. Others award the palm to the shock of January 3. At this time all sorts of movements were noted. One of the railroad officials was at his desk and in reaching for the lamp noticed that his flat-bottomed inkstand had jumped into the air and turned completely over, coming to rest bottom side up. As the city had been almost entirely demolished by the previous quakes, no additional damage was done by this one. On the contrary the people were rather aided in their work by the falling of half-ruined walls and the general settling of partly ruined buildings.

Up to the time of my departure from the country, about February 20, slight shocks were of daily occurrence. As the first and sixth great shakes had come with the full of the moon, people were apprehensive about what would happen when the full moon again came round. Cable reports of February 26 state that telegraphic communication was interrupted at this time by earthquake shocks of an extremely violent character.

#### PRESENT CONDITIONS AND NEEDS

Before this great calamity the city of Guatemala boasted a population of about 125,000. In February it was estimated that about 40,000 people had left the city. Some were slowly drifting back; but at that time people were still dazed, and the serious work of cleaning up had hardly begun. It is clearly evident that the inhabitants of this once beautiful city can never hope to rebuild it along the lines of the old city. Either concrete structures must be erected, which seems out of the question because of the great expense involved, or a city of wooden houses with corrugated iron roofs must spring up. This latter plan seems to be the most feasible one. With a single exception<sup>5</sup> every house not only in the city but for a radius of perhaps twenty miles was damaged. In the city itself perhaps twenty houses may be repaired. The débris of the rest must be removed and dumped into the *barrancas*, the great ravines which encircle the town. This in itself is something of a task, as it is estimated that more than two million cubic yards of stone and earth must be run out by portable railroads. Such a work cannot be accomplished in less time than eight or ten months. Meanwhile the people are living in shacks in the public parks and the plains outside of the city. The United States Government

<sup>5</sup> The exception noted is a house of reinforced concrete which was in process of construction and was absolutely undamaged.

after the first news of the disaster sent 4,000 tents, which have been put up in various parts of the suburbs, and the Red Cross is doing valiant work. The rainy season is at hand, and pestilence will surely break out with the coming of the long period of rains. The work of removing the débris will then be much retarded, as, instead of loose earth, mud will have to be transported. Altogether in this unfortunate place conditions exist akin to those in the devastated portions of France; but in Guatemala nature, not man, is responsible, and while there must soon be an end to man's destructive energy no one can foretell when the earth in this volcanic country will finally cease its shaking.

The Guatemalans look to us for assistance. The rebuilding of this city must be financed from the United States. Already the work of the Red Cross is fast drawing this people closer to us in the bonds of good fellowship, and we have now an opportunity to cement this union into a lasting friendship.